Application Serial No. 10/561,057   PATENT
Reply to Notice of July 9, 2009   Docket: CU-4621

Listing of The Claims

      The listing of claims presented below will replace all prior versions, and listings, of claims in the application.

Listing of claims:

1.   (previously presented) A method for marking a DiffeServ Code Point (DSCP) while achieving guaranteed quality of service (QoS) by using Differentiated Services (DiffServ) in the wireless access network of the IP-based universal mobile telecommunication system (UMTS), wherein said mobile communication system comprises a core network, one or more universal terrestrial radio access networks (UTRANs) and a plurality of user equipments (UEs), wherein the core network communicates with the UTRAN via an Iu interface, and said UTRAN communicates with one or more UEs via Uu interfaces, each of said UTRAN comprises a plurality of radio network controllers (RNCs) and one or more Nodes B communicating with said RNC via Iub interfaces, and each Node B comprises one or more cells, and the communication between the RNCs being performed via Iur interfaces; said method comprising the following steps of:

      in the outgoing direction of the Iub interfaces at the Node B side, the node B side classifying all the uplink Iub interface data streams generated by the Node B into DCH FP data frames, RACH/CPCH FP data frames, and Node B Application Part (NBAP) signaling and Operation & Maintenance (O&M) data streams, and assigning and adjusting the priorities of the classified data streams according to the principles for optimizing the QoS and radio resources;

      in the outgoing direction of the Iub interfaces at the RNC side, the RNC side classifying the transmitted data into: uplink DCH FP data frames transparently forwarded from the Iub interfaces; uplink RACH/CPCH FP data frames from the Iub interfaces, medium access control (MAC) layer service data units (SDU) processed by the MAC layer functional entity (MAC-c/sh) forming the corresponding upward Iur interface RACH/CPCH FP data frames; downlink Iur interface FP data frames generated by the RNC as a SRNC and transmitted to a Drift Radio Network Controller (DRNC); and radio network sub-system application part (RNSAP) signaling streams,

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and assigning and adjusting the priorities of the classified data streams according to the principles for optimizing the QoS and radio resources; and

in the outgoing direction of the Iur interface at the RNC side, the RNC side classifying the transmitted data into: downlink DCH/HS-DSCH FP data frames transparently forwarded from the Iur interfaces; downlink DSCH FP data frames from the Iur interfaces, the MAC layer SDUs processed by the MAC-c/sh forming the corresponding downlink Iub interface DSCH FP data frames; downlink Iur interface FACH FP data frames which, after being processed by the MAC-c/sh, are multiplexed with logic channels and form downlink Iub interface downlink FACH FP data frames; downlink Iub interface FP data frames generated by the RNC and directly transmitted to the Node B; and NBAP signaling and O&M data streams, and assigning and adjusting the priorities of the classified data streams according to the principles for optimizing the QoS and radio resources.

2.   (original) The method as defined in claim 1, wherein the step of assigning the priorities of various data streams in the outgoing direction of the Iub interfaces at the Node B side further comprises the following steps of:

regarding DCH FP data frames and RACH/CPCH FP data frames in the uplink Iub interface data streams generated by the Node B, assigning corresponding priorities to the DCH FP data streams and the RACH/CPCH FP data frames according to the borne classes of services;

assigning a highest priority to the NBAP signaling and assigning a lower priority to the O&M data streams;

increasing the priority of the IP packets from the Node B;

regarding the DCH FP data frames which need to reach the SRNC through the DRNC, increasing the priority of the IP packets bearing the DCH FP data frames; and

marking DSCP values of the IP packets according to the priority of the IP packets and the unified mapping relation of the RNC/Node B.

3.   (original) The method as defined in claim 1, wherein the step of assigning the priorities of various data streams in the outgoing direction of the Iub interfaces at the

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RNC side further comprises the following steps of:

regarding downlink Iub interface FP data frames generated by the RNC and directly transmitted to the Node B, assigning corresponding IP packet priorities to the FP data streams according to the classes of the services borne by the corresponding transmission channels;

assigning a highest priority to the NBAP signaling and assigning a lower priority to the O&M data streams;

if the FP data frames contain radio access bearer (RAB) data units of a radio link control (RLC) using an AM mode, regarding the IP packets bearing RLC re-transmitted PDUs and the IP packets bearing STATUS, RESET, RESET ACK and other RLC control PDUs, increasing the priority of the IP packets corresponding to the FP data frames;

regarding the downlink Iub interface FACH FP data frames having been processed by the MAC-c/sh, using a predefined priority, and assigning a lower priority to the FP data frames of a paging channel (PCH);

marking the DSCP value of the IP packets according to the unified mapping relation of the RNC/Node B; and

regarding downlink DCH/HS-DSCH FP data frames from the Iur interfaces which need to be transparently forwarded, and the Iub interface DSCH FP data frames formed after being processed by the MAC-c/sh, a DSCP fields of the IP packets corresponding to the data frames originally entered from the Iur interfaces being directly regarded as the DSCPs of the IP packets of the corresponding data frames transmitted to the Iub interfaces.

4.   (original) The method as defined in claim 1, wherein the step of assigning the priorities of various data streams in the outgoing direction of the Iur interface at the RNC side further comprises the following steps of:

regarding downlink Iur interface FP data frames generated by the RNC as a SRNC and transmitted to the DRNC and the RNSAP signaling, assigning the corresponding IP packet priorities to the FP data streams according to the classes of the service borne by the corresponding transmission channels;

if the FP data frames contain radio access bearer (RAB) data units of a radio link control (RLC) using an AM mode, regarding the IP packets bearing RLC re-transmitted PDUs and the IP packets bearing STATUS, RESET, RESET ACK and other RLC control PDUs, increasing the priority of the corresponding IP packets;

if the FP data frames are the DCH FP data frames which need to reach the SRNC through the DRNC, increasing the priority of the IP packets bearing the DCH FP data frames;

once the priorities of the IP packets of the above types of data streams are determined, marking the DSCP values of the IP packets according to the unified mapping relation of the RNC/Node B; and

regarding uplink DCH FP data frames from the Iub interfaces which need to be transparently forwarded, DSCP fields of the IP packets of the corresponding data frames originally entered from the Iur interfaces being directly copied as the DSCPs of the IP packets of the corresponding data frames transmitted to the Iub interfaces; and

regarding the uplink Iur interface RACH/CPCH FP data frames formed after being processed by the MAC-c/sh, using one same predefined priority and marking the DSCP.

5.   (original) The method as defined in claim 1, wherein

the step of assigning the priority of various data streams in the outgoing direction of the Iub interfaces at the Node B side further comprises the step of: regarding the DCH FP data frames and RACH/CPCH FP data frames in the uplink Iub interface data streams generated by the Node B, assigning the corresponding priorities to the DCH FP data frames and RACH/CPCH FP data frames according to the borne classes of services;

the step of assigning the priority of various data streams in the outgoing direction of the Iub interface at the RNC side further comprises the step of: regarding the downlink Iub interface FP data frames generated by the RNC and directly transmitted to the Node B, assigning the priorities of the IP packets corresponding to respective FP data frames according to the classes of services borne by the corresponding transmission channels; and

the step of assigning the priority of various data streams in the outgoing direction of

the Iur interface at the RNC side further comprises the step of: regarding the downlink Iur interface FP data frames generated by the RNC as a SRNC and transmitted to the DRNC and the RNSAP signaling, determining the priorities of the IP packets corresponding to respective FP data frames according to the classes of services borne by the corresponding transmission channels.

6.   (original) The method as defined in claim 1, wherein:

the step of assigning the priority of various data streams in the outgoing direction of the Iub interfaces at the Node B side further comprises the step of: assigning a highest priority to the NBAP signaling and assigning a lower priority to the O&M data streams;

the step of assigning the priority of various data streams in the outgoing direction of the Iub interface at the RNC side further comprises the step of: assigning a highest priority to the NBAP signaling and assigning a lower priority to the O&M data streams; and

the step of assigning the priority of various data streams in the outgoing direction of the Iur interface at the RNC side further comprises the step of: assigning a highest priority to the NBAP signaling and assigning a lower priority to the O&M data streams.

7.   (original) The method as defined in claim 1, wherein:

the step of assigning the priority of various data streams in the outgoing direction of the Iub interfaces at the Node B side further comprises the step of: increasing the priorities of the IP packets transmitted from the Node B.

8.   (original) A method as defined in claim 1, wherein:

the step of assigning the priorities of various data streams in the outgoing direction of the Iub interfaces at the Node B side further comprises the step of: regarding the DCH FP data frames which need to reach the SRNC through the DRNC, increasing the priority of the IP packets bearing the DCH FP data frames; and

the step of assigning the priority of various data streams in the outgoing direction of the Iur interfaces at the RNC side further comprises the step of: increasing the priority of the IP packets bearing the DCH FP data frames.

9.   (original) The method as defined in claim 1, wherein:

the step of assigning the priority of varius data streams in the outgoing direction of the Iub interfaces at the RNC side further comprises the step of: if the FP data frames contain RAB data units of the RNC using an AM mode, regarding the IP packets bearing RLC re-transmitted PDUs and the IP packets bearing STATUS, RESET, RESET ACK and other RLC control PDUs, increasing the priority of the IP packets corresponding to the FP data frames; and

the step of assigning the priority of various data streams in the outgoing direction of the Iur interfaces at the RNC side further comprises the step of: if the FP data frames contain radio access bearer (RAB) data units of a radio link control (RLC) using an AM mode, regarding the IP packets bearing RLC re-transmitted PDUs and the IP packets bearing STATUS, RESET, RESET ACK and other RLC control PDUs, increasing the priority of the corresponding IP packets.

10.   (original) The method as defined in claim 1:

the step of assigning the priority of various data streams in the outgoing direction of the Iub interfaces at the RNC side further comprises the step of: regarding the downlink Iub interface FACH FP data frames having been processed by the MAC-c/sh, using a predefined priority, and since the paging information is non-connected RRC message, the FP data frames of the PCH being assigned a lower priority; and

the step of assigning the priority of various data streams in the outgoing direction of the Iur interfaces at the RNC side further comprises the step of: regarding the corresponding uplink Iur interface RACH/CPCH FP data frames formed after being processed by the MAC-c/sh, using the same one predefined priority and marking the DSCP.

11.   (original) The method according to any one of the above claims, wherein when the network is congested, the data streams having a high level will have the higher priority than those having a lower level in aspect of queue and source occupancy, and the packets having a lower priority in the same queue are discarded.